



# RF EXPOSURE REPORT

**REPORT NO.:** SA960815L14A

**MODEL NO.:** TEW-632BRP

**ACCORDING:** FCC Guidelines for Human Exposure  
IEEE C95.1

**APPLICANT:** TRENDware International Inc.

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## RF EXPOSURE MEASUREMENT (MOBILE DEVICE)

### 1. INTRODUCTION

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Fully Anechoic Chamber (FAC) calibrated for antenna measurement in ADT, and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

### 2. RF EXPOSURE LIMIT

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

FREQUENCY RANGE (MHz)	ELECTRIC FIELD STRENGTH (V/m)	MAGNETIC FIELD STRENGTH (A/m)	POWER DENSITY (mW/cm <sup>2</sup> )	AVERAGE TIME (minutes)
<b>(A)LIMITS FOR OCCUPATIONAL / CONTROL EXPOSURES</b>				
300-1500	...	...	F/300	6
1500-100,000	...	...	5	6
<b>(B)LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE</b>				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz



### 3. FRIIS FORMULA

Friis transmission formula :  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

$R$  = distance between observation point and center of the radiator in cm

If we know the maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the MPE value at distance  $r$ .

Ref.: David K. Cheng, *Field and Wave Electromagnetics*, Second Edition,

Page 640, Eq. (11-133).

### 4. EUT OPERATING CONDITION

The software provided by Manufacturer enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

### 5. CLASSIFICATION

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in users manual. So, this device is classified as **Mobile Device**.



## 6. TEST RESULTS

### 6.1 ANTENNA GAIN

The maximum Gain measured in Fully Anechoic Chamber is 2dBi or 1.5849(numeric).

### 6.2 OUTPUT POWER INTO ANTENNA & RF EXPOSURE VALUE AT DISTANCE 20cm:

#### 802.11b DSSS MODULATION

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/cm <sup>2</sup> )
1	2412	50.119	17.00	0.016	1.0
6	2437	51.523	17.12	0.016	1.0
11	2462	51.761	17.14	0.016	1.0

#### 802.11g OFDM MODULATION

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/cm <sup>2</sup> )
1	2412	51.642	17.13	0.016	1.0
6	2437	50.466	17.03	0.016	1.0
11	2462	50.699	17.05	0.016	1.0



### DRAFT 802.11n (20MHz) OFDM MODULATION

CHAN.	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/cm <sup>2</sup> )
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2412	32.434	32.659	15.11	15.14	65.093	18.14	0.021	1.0
6	2437	32.359	32.659	15.10	15.14	65.018	18.13	0.021	1.0
11	2462	32.137	31.915	15.07	15.04	64.052	18.07	0.020	1.0

### DRAFT 802.11n (40MHz) OFDM MODULATION

CHAN.	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)		PEAK POWER OUTPUT (dBm)		TOTAL PEAK POWER (mW)	TOTAL PEAK POWER (dBm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT OF POWER DENSITY (mW/cm <sup>2</sup> )
		CHAIN 0	CHAIN 1	CHAIN 0	CHAIN 1				
1	2422	12.647	12.823	11.02	11.08	25.470	14.06	0.008	1.0
4	2437	12.853	12.823	11.09	11.08	25.676	14.10	0.008	1.0
7	2452	12.618	12.677	11.01	11.03	25.295	14.03	0.008	1.0